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EXAMINER	
DANG, HUNG Q	
ART UNIT	PAPER NUMBER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/549,277	HUANG ET AL.	
	Examiner	Art Unit	
	HUNG Q. DANG	2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *28 April 2010*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,5-21,24-28 and 34-42* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,5-21,24-28 and 34-42* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

1. This communication is in response to the claims' amendments dated 4/28/2010. The amendments of claims 1, 5, 10, 24; and the cancellation of claims 2-4, 22-23, 29-33 have been entered.

Response to Arguments

2. Applicant's arguments filed on 4/28/2010 have been fully considered but they are not persuasive.

- **Issues raised by the Applicant:**

a) The Applicant's arguments on pages 9-11 of the Remarks regarding the Shi reference.

b) The Applicant's argument on pages 11-12 of the Remarks "*The Office Action argued that the feature of unamended claim 5 was disclosed by Dubinsky in the paragraph bridging columns 4 and 5. Dubinsky refers to a Helmholtz resonator and the Office Action points out that a Helmholtz resonator is also used by embodiments of the invention. At first sight that would suggest similarity, but the ways in which a resonator is used are very different. The reflector taught in this paragraph of Dubinsky is described as changing between a state which* ***reflects strongly*** *and a state which attenuates the signal and so* ***reflects weakly***. ***There is no teaching of reflection with change of phase, neither is there teaching of dimensions which would inherently lead to reflection with a change of phase.***

The present description explains its use of a Helmholtz resonator with reference to Figure 1. There is switching between reflection by upper packer 134 when valve 161 is closed, and a second state when there is phase shifting reflection involving the fluid filled volume 132 when the valve 161 is open. Page 9 of the present text quotes formulae which relate the reflecting properties to the dimensions of volume 132. Thus the present description teaches ***effective reflection****, either without change of phase (function of upper packer 134 when valve 161 is closed) or with change of phase (open valve 161 brings Helmholtz reflector into play).*

By contrast, Dubinsky's description of Fig 3c shows that the manner in which the Helmholtz reflector is used is entirely different from what is contemplated by the present description. As a plate or flapper valve is moved, there is a change between reflection and no reflection. This is consistent with Dubinsky's reliance on amplitude modulation and Fig 3b of Dubinsky in which numerals 332a and 332b indicate switching between reflection and zero reflection."

c) The Applicant's argument on page 12 of the Remarks "C*laim 10 as amended specifies a resonator which is switched between open and closed off from the acoustic channel. This feature is absent from the prior references and is used by embodiments of the invention to give phase shifting."*

d) The Applicant's arguments on pages 12 of the Remarks "*Claims 37, 40 and 42 refer to the frequency of the resonator being matched to the carrier signal. This feature is not suggested by Dubinsky, neither is use of a continuous carrier wave as*

called for by claim 36, 39 and 41. These features distinguish from Dubinsky's deliberate reliance on a signal which is a series of pulses, giving a range of frequencies so that the resonant frequency of the Helmholtz resonator has little significance. The suggestion in the Office Action that it would be obvious to adopt such expedients is respectfully disputed. The reader is not compelled to merge Dubinsky and Shi and is not compelled to arrive at these further departures from what is disclosed by prior documents."

e) The Applicant's arguments on page 12 of the Remarks "*The Office Action further relies on Priest et al US 5,444,324 in addition to the other prior references against some dependent claims. Claims 19 and 34 call for collection of energy from the acoustic carrier. Priest does not relate to this, but to the use of electrical power available downhole. The passage in column 1 of Priest refers to converting electrical energy into acoustic energy and provides no disclosure of converting acoustic energy to electrical. Neither does it provide any motive to do so. Thus it does not lead to the features of these dependent claims.*"

- **The Examiner's position:**

a) The Applicant's arguments on pages 9-11 mainly involve the Shi reference are not persuasive because the mentioned Shi reference was totally not applied in the previous Office Action.

b) The Examiner respectfully disagrees with the Applicant. The Applicant's argument concerns strong and weak reflection of the signals, which is not recited by the claimed limitations. Furthermore, strong or weak signal reflection is merely relative.

Dubinsky teaches that the modulator switches the reflection properties of the reflecting terminal between a first state (see figure 4B; when flap 26a is in horizontal position) that causes the phase of an acoustic wave reflected at said terminal and a second state (figure 4B; when flap 426a is in vertical position) that maintains the original phase of the incident wave. Therefore, Dubinsky does suggest a change in phase of the reflected signal.

c) The newly amended limitations in claim 10 will be addressed below.

d) The Examiner respectfully disagrees with the Applicant. **Column 5 lines 8-12** of Dubinsky indicates that the reflected signal might be **phase-shifted** and figure 3A of Dubinsky indicates the user of a carrier wave. Therefore, to further apply an acoustic **carrier signal** to the system of Dubinksy so that the reflected signal, when received, will be phase-shifted would have been obvious to one ordinary skill in the art.

e) The Applicant's argument is not persuasive because it refers to the Priest et al. reference, which was not applied anywhere in the previous Office Action.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 1, 5-8, 10, 11, 12, 14, 15, 17, 20, 21, 24, 25, 28, 38, 40 and 42 are rejected under 35 U.S.C. 102(e) as being anticipated by Dubinsky U.S. Patent 6,757,218.

Note: according to page 8 lines 12-16 and page 10 lines 15-26 of the specification, the claimed modulator in claim 1 is a stop valve that opens or blocks the access to the liquid volume (132)....; and together with the Helmholtz resonator...the reflected wave becomes a BPSK (binary phase shift key) modulated wave, transmitting data to the surface.

Regarding claims 1, 16 and 38, Dubinsky teaches an acoustic telemetry apparatus for communicating digital data from a down-hole location through a borehole to the surface comprising (see figure 2):

an acoustic channel (figure 2, channel 204) terminated at a down-hole end by a reflecting terminal (figure 2, unit 208);

an acoustic wave generator located at the surface and providing an acoustic wave carrier signal within said acoustic channel (column 4, lines 36-45);

a modulator and a reflecting terminal located at said down-hole location, wherein the modulator and the reflecting terminal form a phase shifting reflector configured to modulate phase (column 5 lines 8-12 indicates that the reflected signal might be **phase-**

shifted) of the transmitted signal in response to a digital signal; the modulator and the reflecting terminal being switchable between a first reflecting state which reflects the transmitted signal and a second reflecting state which also reflects the transmitted signal with said second reflecting state giving a shift in phase relative to reflection by said first state (paragraph bridging columns 4-5; and column 5 line 63 to column 6 line 10; and **column 5 lines 8-12** indicates that the reflected signal might be **phase-shifted**. Figure 3A shows the uses of a carrier wave. Therefore, to further apply an acoustic **carrier signal** to the system of Dubinksy so that the reflected signal, when received, will be phase-shifted would have been obvious to one ordinary skill in the art); and

one or more sensors (figure 2, unit 214) located at the surface adapted to detect related modulated information of acoustic waves traveling within said acoustic channel.

Notice that from column 5 line 63 to column 6 line 10, Dubinsky teaches that the resonator having a **two-position** flap (426). The flap 426 is mounted to the body 422 on a controllable pivot 428 that allows the flap 426 to be controlled to at least two positions 426a and 426b.....One position 426a of the flap 426 results in a little or not reflection of a source signal. A second position 426b of the flap 426 results in a substantial reflection of the source signal. **Thus a binary string message is easily created** that is passively **transmitted to the surface as an echo signal by control of the flapper 426**.

As mentioned in the above NOTE, **the claimed modulator, as supported by the specification, is an open/close valve which operates in the same manner as the flapper taught by Dubinsky to ultimately generate binary data**.

Regarding claim 5, Dubinsky teaches that the modulator switches the reflection properties of the reflecting terminal between a first state (see figure 4B; when flap 26a is in horizontal position) that causes the phase of an acoustic wave reflected at said terminal and a second state (figure 4B; when flap 426a is in vertical position) that maintains the original phase of the incident wave.

Even though, Dubinsky does not specifically disclose that the reflected signal when the reflecting terminal is at the first state **is 180 degree (or inverted**) shifted from the original signal and that the reflected signal maintains the original phase of the incident wave when the reflecting terminal is at the second state, however, one of ordinary skill in the art would recognize that such phase shift merely depends on the length of the reflecting chamber. Therefore, to achieve 180 degree phase shift in the reflected signal, the length of the chamber would need to be designed so that the time it takes for the incident wave to reflect at the first state and the second state would yield 180 degree in phase shift of the reflected signal.

Regarding claim 6, the acoustic channel disclosed by Dubinsky is also a column of liquid extending from the surface to a down-hole location (column 4, lines 36-48).

Regarding claim 7, the acoustic channel disclosed by Dubinsky is also formed by filling an annular volume in the borehole with a liquid (figure 2 and column 4, lines 36-48).

Regarding claim 8, Dubinsky also teaches that the acoustic channel is formed by filling a tubing string suspended in the borehole with a liquid (column 4, lines 36-46).

Regarding claims 10 and 24, the modulator disclosed by Dubinsky is also a Helmholtz resonator located in the vicinity of the reflecting terminal point and a valve to open and close access to the resonator (see paragraph bridging columns 4-5). Also see the rejection of claim 1.

Regarding claim 11, the resonator disclosed by Dubinsky also comprises a liquid filled volume enclosed in a housing having a tubular opening to the reflecting terminal (column 5 lines 39-55; the tubular openings in this case are the controlled pistons).

Regarding claim 12, the resonator disclosed by Dubinsky also has two or more tubular openings to the reflecting terminal (column 5 lines 39-55; the tubular openings in this cases are the controlled pistons).

Regarding claim 14, Dubinsky also teaches an acoustic receiver (figure 2, unit 210) in a downhole location adapted to receive acoustic wave signal in a down-hole location.

Regarding claim 15, the digital data disclosed in Dubinsky's system is also encoded digital data (see figure 2).

Regarding claim 17, the sensors disclosed by Dubinsky are also connected to a signal processing unit adapted to filter the carrier wave signal from detected information (column 4, lines 44-46).

Regarding claim 20, Dubinsky also teaches the use of the apparatus of claim 1 in a well stimulation operation. The well stimulation operation in this case is the operation of the downhole Helmholz resonator being resonated by the received acoustic signal.

Regarding claims 21, 28, 40 and 42, see the rejection of claim 1.

Regarding claim 25, Dubinsky also teaches the steps of performing measurements of downhole parameters; encoding said measurements into a bitstream; and controlling the reflecting properties of the reflecting terminal in response to said encoded bitstream (column 7, lines 34-50).

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6. Claims 9, 13, 26, 27, 36, 37, 39 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky U.S. Patent 6,757,218.

Regarding claim 9, even though Dubinsky does not specifically that the column of liquid has a viscosity of less than 3 x 10^(-3) NS/m^2, however, it would have been obvious to one of skilled practitioner to derive such viscosity through routine experimentations to achieve an optimal liquid channel for said acoustic data transmission.

Regarding claim 13, even though Dubinsky does not specifically teach that the acoustic wave generator is adapted to simultaneously generate acoustic waves at different frequencies, however, one of ordinary skill in the art at the time the invention was made would recognize that if a downhole data receiver is desired, then a different acoustic signal, which has a different frequency from the frequency of the acoustic signal that is used to resonate the downhole resonator, can be used to transmit control data to the downhole receiver just like in any other conventional downhole telemetry systems.

Regarding claims 26 and 37, even though Dubinsky does not specifically mention the step of selecting the frequency of the carrier wave such that it is close to the resonance frequency of the resonator used to modulate said carrier wave, however, one of ordinary skill in the art would recognize that Helmholz resonator optimally operates at its resonant frequency. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the step of selecting the frequency of the carrier wave such that it is close to the resonant frequency of the resonator so that the resonator can be resonated (enabled) to modulate the carrier wave.

Regarding claims 36, 39 and 41, even though Dubinsky does not specifically disclose that the acoustic wave carrier signal is continuous, however, one of ordinary skill in the art would recognize that if data is desired to be continuously transmitted and received, then clearly, the acoustic wave carrier signal would have to be continuous.

Regarding claim 27, Dubinsky teaches the method of claim 21. However, Dubinsky does not teach the steps of scanning through a range of possible carrier frequencies; monitoring at the surface reflected and modulated wave signal; selecting the frequency of the carrier wave such that the detection of said reflected and modulated wave signal is optimized; and commencing the communication of down-hole measurements.

The claimed steps are merely the conventional method of selecting an optimal frequency through a range of possible frequencies to achieve optimal data transmission with minimal noise and interference. The Examiner gives Official Notice that such frequency selecting method has been commonly known and applied in many acoustic communication systems in order to optimize data transmission with minimal noise and interference.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide such frequency scanning steps to the method disclosed by Dubinsky so that optimal acoustic transmission can be achieved.

7. Claims 18-19, 34-35 and 43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dubinsky U.S. Patent 6,757,218 in view of KARL et al. WO 03/067029.

Regarding claims 18-19 and 34, Dubinsky does not specifically mention that the downhole power generator is adapted to convert acoustic energy from an acoustic wave signal generated at the surface.

KARL et al., in the same field of endeavor, discloses the conventionality of using down-hole power generator that is adapted to convert acoustic energy from an acoustic wave signal generated at the surface (see page 3, lines 12-13; and page 8, lines 34-37).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to provide the conversion of the received acoustic wave signal into electrical signals for use as the downhole power generator disclosed by Dubinsky as suggested by KARL et al.

Regarding claim 35, the Examiner gives Official Notice that capacitors have been commonly known and used for storing electrical energy. Therefore, it would have been obvious to provide an energy storing capacitor to the downhole power generator of the system disclosed by Dubinsky to store electrical energy to provide energy/power to one or more downhole devices.

Note: MPEP 2144.03©

if applicant does not traverse the examiner's assertion of official notice or applicant's traverse is not adequate, the examiner should clearly indicate in the next Office action that the common knowledge or well-known in the art statement is taken to be admitted prior art because applicant either failed to traverse the examiner's assertion of official notice or that the traverse was inadequate. If the traverse was inadequate, the examiner should include an explanation as to why it was inadequate.

Since the Applicant has not traversed the above given Official Notice, said Official Notice has become the Applicant's prior art admission.

Regarding claim 43, claim 43 is rejected for the same reasons stated in the rejections of claims 1, 6, 7 and 19.

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to HUNG Q. DANG whose telephone number is (571)272-3069. The examiner can normally be reached on 9:30AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Zimmerman can be reached on (571) 272-3059. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/H Q D/
Examiner, Art Unit 2612
12/18/2010

/Albert K Wong/
Primary Examiner, Art Unit 2612